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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/566,633

01/31/2006

Katsuo Kazahaya

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EXAMINER

MILLER, DANIEL H

ART UNIT

PAPER NUMBER

1783

MAIL DATE

DELIVERY MODE

04/27/2010

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/566,633	<b>Applicant(s)</b> KAZAHAYA ET AL.	
	<b>Examiner</b> DANIEL MILLER	<b>Art Unit</b> 1783	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 4/12/2010.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-3 and 5-20 is/are pending in the application.
- 4a) Of the above claim(s) 17-20 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-3 and 5-16 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)          | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

## **DETAILED ACTION**

### ***Continued Examination Under 37 CFR 1.114***

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 4/12/2010 has been entered.

### ***Claim Rejections - 35 USC § 103***

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-3, 5-8, 14 and 16 are rejected under 35 U.S.C. 103(a) as obvious over Plano (US 5,803,967).in view of Phillips (US 5,571,615) further in view of Tribochemistry Between Hydrogen and Diamond Like Carbon Films, Fontaine; Surface and Coating Technology 146-147 (2001) 286-291 (as evidence of effect of Hydrogen on diamond film structures).

2. Plano teaches a silicon carbide substrate (cermet, see claim 23 (a)) having textured and highly oriented diamond layers includes the steps of forming a plurality of diamond nucleation sites on a substrate and then growing diamond on the sites so merge and form a continuous diamond layer having [100] and [111] facets (see abstract). The growing step is performed by repeatedly cycling between first growth parameters, which favor growth of the nucleation sites in a direction normal to the [100] facets relative to growth in a direction normal to the [111] facets, and second growth parameters, which favor growth of the [100] facets relative to growth of the [111] facets, in sequence (see abstract). The result is a smooth polycrystalline diamond layer (see abstract and example).

3. Surface roughness below about 0.3 d.sub.ns and more preferably, below about 0.1 d.sub.ns, and to achieve a low [100] facet tilt, the second diamond layer(s) 65 is preferably grown to a thickness between about 2-20 (.mu.m) or even less. The examiner contends that the surface roughness taught would be expected to overlap and the desire for a very low surface roughness would render obvious the claimed range given the disclosed ranges of Plano. No patentable distinction is seen.

4. To the extent to which the pre-amble is given patentable weight and that the term "cutting tool" implies any type of structure, which it is not clear it does, Plano does not appear to disclose a cutting tool or the exact surface roughness claimed.

Phillips teaches a, cutting tool, cement carbide substrate having a diamond film coating having a grain size of less than about 0.5 microns; within applicant's claimed range (abstract, and claim 2). The diamond coating has a thickness of greater than

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about 10 micrometers (column 4 lines 50-60). The reference discloses a superior smooth surface (see comments on figures), but does not specifically disclose the claimed surface roughness. However, given that the diamond film has a substantially similar thickness and grain size and is produced via CVD methods, similar to applicant's disclosed method, and the overlapping thickness of Plano, it would have been obvious to one of ordinary skill in the art at the time of the invention to provide a low surface roughness diamond film by employing known processing conditions for diamond films in order to obtain a surface roughness as low as possible; including a surface roughness less than 0.2 microns, as claimed, since a smooth diamond surface is highly desired by Phillips.

Regarding claims 2-8 and 14 and 16, Phillips discloses a superior smooth surface (see comments on figures) produced via a CVD process, but does not specifically disclose the claimed surface roughness. However, given that the diamond film has a substantially similar thickness and grain size and is produced via CVD methods, similar to applicant's disclosed method (see embodiments in the instant specification); the diamond film would be expected by one of ordinary skill to be optimizable for surface smoothness and evenness (and would be expected to obtain similar aspect ratios given similar grain sizes) in so doing achieve substantially similar physical properties and characteristics as claimed. It is not clear that there are any processing conditions that are different between Phillips and the instant claimed invention that would produce differing characteristics.

More specifically regarding claim 16, it is not clear that the further defined process produce a distinctly different product given the instant disclosure and the art of record, therefore the process limitation is not considered to produce a distinct product further defining the claimed product.

It would have been obvious to one of ordinary skill in the art at the time of the invention to provide a diamond film of the claimed crystal structures and orientation known in the art which have high aspect ratio within applicant's claimed range (i.e. columnar structures having high aspect ratios). It further would have been obvious to provide any desired thickness including a single crystal thicknesses, and an optimized hydrogen content by varying the processing time and other processing conditions (i.e. pressure; as taught by Phillip see column 4 regarding CVD processing) in order to obtain a diamond film ideal for particular applications limiting the hydrogen content, consistent with hydrogen contents known effect on the physical properties of the diamond film (see *Tribochemistry Between Hydrogen and Diamond Like Carbon Films*, Fontaine; *Surface and Coating Technology* 146-147 (2001) 286-291 as evidence of effect of Hydrogen on diamond film structures). No patentable distinction is seen.

Regarding applicant's amendments to claims, it is noted that applicant has not defined primary and secondary grain structures. Further there is no requirement that the two claimed grain structures are different in any way nor is it clear that there is any nexus between the added claim language and the Raman Spectroscopy results and "double crystal structure" as defined by applicant's affidavit after the filing of the instant

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application. Phillips has multiple diamond grain structures that can be considered primary and secondary grain structures. No patentable distinction is seen.

Claims 9-13, and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Plano (US 5,803,967).in view of Phillips (US 5,571,615), in view of Tribochemistry Between Hydrogen and Diamond Like Carbon Films, Fontaine; Surface and Coating Technology 146-147 (2001) 286-291 as evidence of effect of Hydrogen on diamond film structures), further in view of Kembaiyan et al (US 2004/0060742).

Phillips teaches a cement carbide substrate having a diamond film coating having a grain size of less than about 0.5 microns; within applicant's claimed range (abstract, and claim 2). The diamond coating has a thickness of greater than about 10 micrometers (column 4 lines 50-60). The reference discloses a superior smooth surface (see comments on figures), but does not specifically disclose the claimed surface roughness. However, given that the diamond film has a substantially similar thickness and grain size and is produced via CVD methods, similar to applicant's disclosed method, therefore would be expected to have substantially similar surface roughness.

None of the previously cited references appear to disclose the cited carbide body (substrate).

Kembaiyan teaches a tungsten carbide body containing cobalt and chromium binder material [0023]. Further, the carbide body has a diamond layered face covering

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the body [0025]. The Cobalt binder can be present between 2% and 12% of the body (see claim 10 ref.); overlapping applicant's claimed range. The tungsten carbide is present at least 80% of the body in some embodiments and from 30% to 99% dependent upon the embodiment (see claims 2 and 25-27 ref). Therefore, the disclosed ranges overlap applicant's claimed ranges of each material.

It would have been obvious to one of ordinary skill in the art at the time of the invention to provide a carbide body, as taught by Kembaiyan, and optimize the level of cobalt and chromium binder within the ranges disclosed by Kembaiyan (above) to within the corresponding levels claimed by applicant in order to provide the most effective tool body having the most advantageous physical characteristics (i.e hardness and wear resistance).

### ***Response to Arguments***

Applicant's arguments with respect to pending claims have been considered but are moot in view of the new ground(s) of rejection.

### ***Conclusion***



Any inquiry concerning this communication or earlier communications from the examiner should be directed to DANIEL MILLER whose telephone number is (571)272-1534. The examiner can normally be reached on M-Th.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Sample can be reached on (571)272-1376. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/David R. Sample/  
Supervisory Patent Examiner, Art Unit 1783

/Daniel Miller/  
Examiner, Art Unit 1794